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On atavistic Variation in Oenothera cruciata

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After *Oenothera Lamarckiana* had shown itself to be a very proper material for the study of the mutations by which new species suddenly arise from old ones, I was naturally led to investigate whether in other plants similar mutations might not be met with. For it is clear that the phenomena shown by Lamarck's evening primrose are of prevailing interest only if they may be taken as an instance of a general rule. The other species of the same genus were of course the first to receive attention. Most of these showed no signs of being fit for a study along the same lines, while on the other hand one, *Oenothera cruciata*, was found to be inconstant in the very character to which it owes its name. At least the plant which is cultivated under this name in European botanical gardens is variable in this regard.

In proposing to bring the results of my experimental cultures of this plant before the readers of this journal, my aim is principally to direct their attention to any deviations which the species of the above-named genus might show in their native localities. For it is of undoubted interest to the study of mutability to know whether the variability which *Oenothera cruciata* displays with us is also met with in America, in those parts where the plant grows wild. The allied forms such as *O. biennis* and *O. muricata*, should be tested in the same direction. Any deviations from the original types should be carefully observed and if possible perpetuated by seeds. Wherever such deviations are found the question would have to be answered whether the general type of the locality possesses the power of again producing this deviation, and perhaps others too, in succeeding years.

[The preceding number of the BULLETIN, Vol. 30, No. 1, for January, 1903 (30 : 1–74, *pl. 1–6*), was issued 4 F 1903.]

Oenothera cruciata Nutt. or *Onagra cruciata* (Nutt.) Small, as it is also called, has been described and figured in Britton and Brown's "Illustrated Flora of the Northern United States, Canada and the British Possessions" (**2**: 485. 1897). It is a rare plant, found wild from Vermont to New York and Massachusetts, and ascends to 2,000 feet in the Adirondacks. It is described as being annual and flowering from August to October. It may readily be recognized, even without flowers, by the narrowly oblong or oblanceolate leaves and the purple color of the nerves and the stem. The flowers are as small as those of *O. muricata*, but the spikes are much more slender and the fruits are less broad. In all these characters the European plants correspond exactly with the description given by Britton and Brown. The petals of the American type are linear instead of being broad and obcordate as in the allied species.

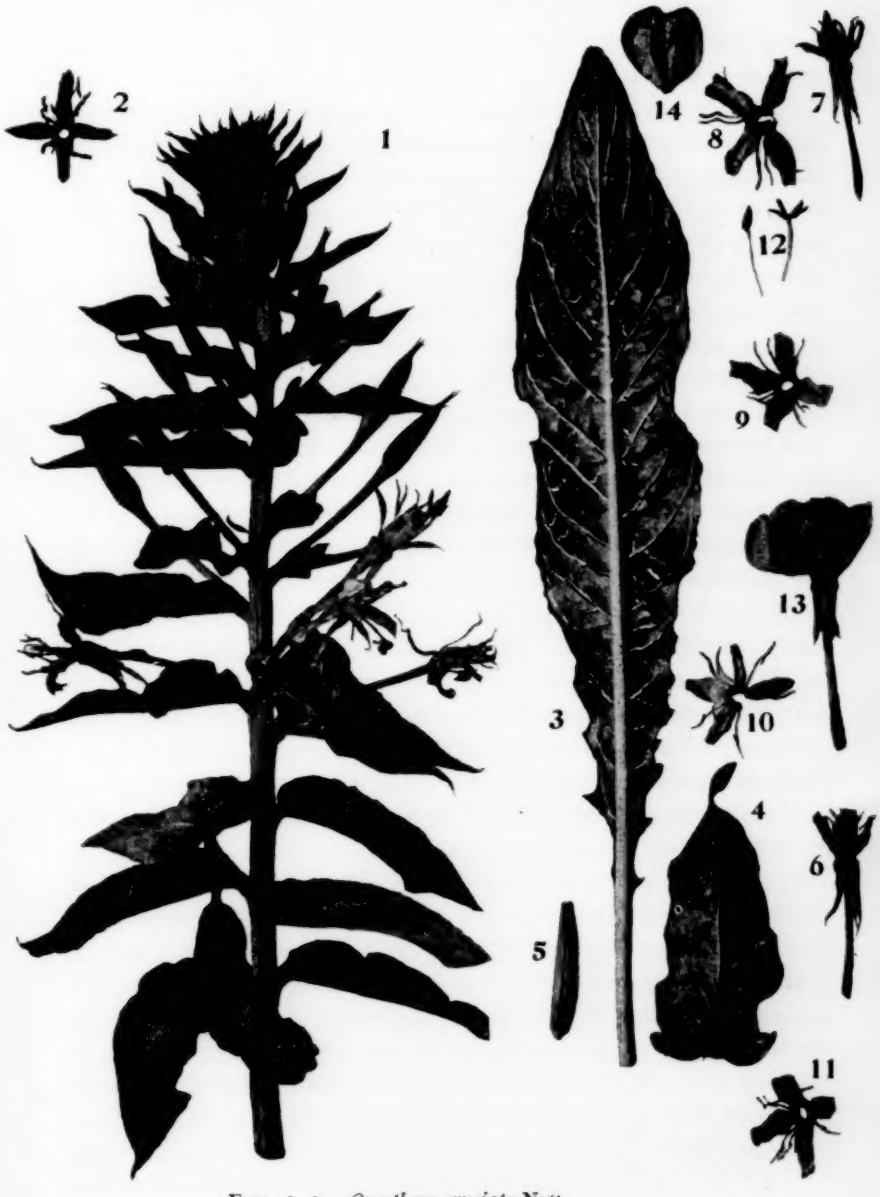
As yet I have not had an opportunity to cultivate the original wild species, but I hope to be able to do so next year, as I have obtained seeds from the Adirondacks through the kindness of Dr. D. T. MacDougal, of New York, and Dr. B. L. Robinson, of Cambridge, Mass.*

Dr. MacDougal had also the kindness to ask Dr. Britton about an eventual variability of the petals, but the celebrated author of the Illustrated Flora informed him that *Oenothera cruciata does not make broad petals* in America.

This is the essential point. For in all the cultures I have as yet been able to make from seeds of this species, sent to me from different botanical gardens in Europe, I found the form of the petals to be varying in a high degree, so as to reach, in many individuals, the same outline as is presented by the petals of the allied species, *O. biennis*, *O. muricata* and others.

For this reason, I presume that our plants are not the typical *O. cruciata* of Nuttall, but a variety, which perhaps has been produced from it in Europe. Therefore I have called my plants *O. cruciata varia*, merely in order to distinguish them from the pure species. How this variety may have originated of course I do not know. Two possibilities present themselves. The one is by mu-

* Seeds from different localities would be always very welcome to me, as the plant may be in a mutable state in some districts, while it is not so in others.



FIGS. 1, 2. *Oenothera cruciata* Nutt.
FIGS. 3–14. *Oenothera cruciata varia* De Vries.

tation, in the same way as many of our ordinary varieties of garden plants have been produced, the other is by crossing, which is perhaps a still more common source of new garden varieties.

Both possibilities seem to me to be of some interest, since they bear directly on the great question of the internal causes of inconstancy in general. For in my variety the petals do not vary according to Quetelet's law, about a mean, which lies somewhere between the obcordate and the linear form, producing petals of which the majority do not essentially differ from this mean, whilst the extremes are very rare. Quite on the contrary, the obcordate and the linear petals seem to be two alternating types only united by rare intermediate steps.

In case my variety originated by a mutation, we would therefore have an imperfect one, producing the new type only in part of the individuals and remaining true or returning to the pure form of *Oenothera cruciata* in the others. In many points this case would be analogous to that of *Oenothera scintillans*, which originated in my garden from *O. Lamarckiana*, but which, though artificially pollinated with its own pollen, returns in each generation in often a relatively large part of the individuals to the original type.

In case my variety originated by a cross, it should first be remarked that the supposed hybrid is not intermediate between *O. cruciata* and some allied species, but that it has, as far as I can judge, all the characters of the former, the constancy in the form of the petals excepted. I have endeavored to show in my "Mutations-theorie" (Part II., p. 100) that *O. muricata* is probably the only species which could have given such a hybrid with the *O. cruciata*. Now it is clear that having once obtained seeds from the original and constant *O. cruciata*, I possess the materials to bring about this crossing and also those with other allied species, and to try whether it will be possible to get an inconstant hybrid in this way. I propose to do so, but from what I know of my *O. cruciata varia* and of the hybrids I have made of it with more than one other species, it is very improbable that the hybrid *O. cruciata* × *O. muricata* will be as a rule inconstant. It is far more probable that it will exhibit the dominant character, which must be the broad petals, and either give a constant progeny with this feature or split up according to Mendel's laws. I take the broad petals to be

phylogenetically older than the linear ones, because they are the rule in the whole genus. But some authors suppose that from time to time there arise exceptions to the ordinary laws governing hybrids, and that such exceptions might be the source of many inconstant varieties and even of inconstancy in general. In this case the chance of getting such an exception by crossing would scarcely be greater than that of getting a mutation from the pure type.

However slight these chances may be, I propose to try both ways and to see whether it would be possible to repeat the as yet doubtful and unknown original production of my *O. cruciata varia*. For there are not a great many cases in which the starting-points are to be had in so pure and so thoroughly controlled a state as in this instance. As to the question of the rule of the constancy of *O. cruciata* under cultivation, and of the hybrids, I hope to solve this in some years; but as to the chances of getting exceptions, it is evident that these are only small and that it would be preferable if the same experiments were made by a number of investigators.

The aim of such experiments would be to repeat artificially the production of *O. cruciata varia* and by this means to throw some light on its origin in particular and on the origin of inconstant varieties in general. With a view to the possible repetition of this cross I will now give a description of the inheritance of the broad and linear petals in this variety. In so doing I limit myself to the detailed exposition of a single experiment carried on with the descendants of one original specimen of my variety.

In the year 1897 this plant was raised from seed obtained in the usual way of exchange between botanical gardens. I obtained but a single specimen, which bore all the characteristics of the typical *O. cruciata*. The spike, before the opening of the flowers, was placed in a bag of prepared parchment paper to prevent any visits from bees. The anthers touch the stigmas when opening, and the flowers fertilize themselves without any aid. In the same way I always took care to collect each year purely pollinated seeds only.

This original plant bore but a few seeds, from which during the next year I obtained only sixteen flowering individuals. But

this number was sufficient to show the whole range of the variability of the race. Nine plants bore typical cruciate flowers with linear petals, two specimens had broad obcordate petals like those of *O. muricata*, and the five remaining had an intermediate breadth, varying in all degrees between these two extremes. Even on the same spike the petals of the different flowers were in this regard unlike each other, and sometimes of the four petals of one flower some were narrow and others broad. I also found petals large on one side of the median nerve and small on the other side.

I obtained pure seed of some of the narrow-petalled ones and of some of the intermediate specimens, separately for each plant, and the next year (1899) had four groups flowering. Two of them from two typically cruciate mothers repeated this type only, each group in thirty plants. One group, also from a cruciate mother, produced twenty-two typical and eight atavistic individuals, meaning thereby those with broad obcordate petals. Intermediate types were wanting. So it was with the fourth group, the children of an intermediate mother, of which only four were purely cruciate, the remaining fifty-eight being atavistic.

Afterwards I continued these four strains, sowing from the two last named in 1900, from the first named in 1901. The atavistic mothers gave only children which were in this regard like them. The purely cruciate strains on the other hand continued to produce atavistic and intermediate types, and these last were also inconstant as far as I observed them.

Taking the five generations together, I had 232 children from cruciate mothers, 103 from intermediate and 141 from atavistic parents. The first group consisted of 85 per cent. cruciate, 5 per cent. intermediate and 10 per cent. atavistic individuals. The second, of 4 per cent. cruciate, no intermediate and 96 per cent. atavistic specimens. The third was nearly constant, all individuals bearing the broad obcordate petals.

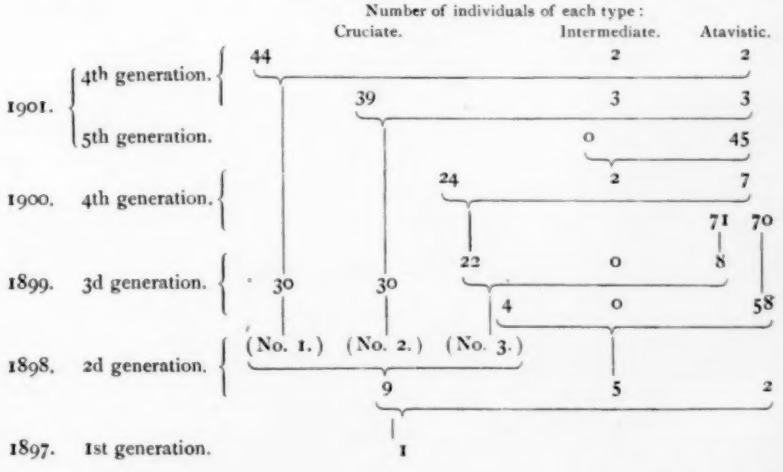
I say nearly constant, for among those atavists I observed some cases of bud-variation, by which they returned to the cruciate type. This rare phenomenon occasionally presents itself without apparent reason, but it may be induced to appear oftener in the following manner. Around the main stem the plants produce a circle of smaller stems growing upwards from the axils of the

root leaves. In my cultures these side-stems do not ordinarily become tall enough to bear flowers. But by cutting out the main stem at an early period I could induce the others to a more vigorous growth. I repeatedly made this experiment; but will only cite here observations made on a single plant in the summer of 1901, grown from seed of a purely cruciate parent. It made six side-stems, out of which three bore only atavistic or broad-petalled flowers. The three other stems likewise produced obcordate petals, but not exclusively, bearing on one side of the spike flowers with the narrow and variable petals of the above-named intermediate types.

Such cases prove that the atavistic individuals are not, or at least are not always, so constant as could be deduced from the figures above given. Analogous instances of sectorial variation, one sector of the spike bearing other flowers than the remaining sectors, were from time to time observed on atavistic individuals and also on intermediate ones, the sport giving flowers with obcordate petals. As yet I have found no such sports on plants of the purely cruciate type nor purely cruciate flowers on those of the two other types. But I have no doubt that this is only due to the small extent of my cultures.

PEDIGREE OF

Oenothera cruciata ♀ *aria*



I give, above, the description of my whole race in the form of a pedigree, omitting the sectorial and bud-variations, again reminding the reader that in every case the seed-bearing plants were fertilized only with their own pollen after enclosure in bags of prepared parchment-paper.

Though the figures of this experiment are but small, they seem to be sufficient to prove the presence of a very curious case of variability, the alternation between the typical cruciate flowers of the species and the atavistic petals of the group to which the species belongs, and to justify the provisional name chosen for my race: *Oenothera* or *Onagra cruciata varia*.

AMSTERDAM.

Nova Ascomycetum Genera Speciesque *

FREDERIC E. CLEMENTS

Chaetosphaeria Thalictri

Peritheciis solitariis, vel laxe gregariis, superficialibus, globosis, ostiolatis, distincte papillato-depressis, pilis flexuosis brunneis 100 × 3 μ dense setulosis, 200–300 μ diam.; ascis octosporis, clavatis, paraphysatis, iodo caerulescentibus, 90–100 × 10 μ; sporis distichis, fuscis, fusiformibus, 3–5-septatis, saepius 4-septatis et loculo secundo turgido, ad septa leniter constrictis, 30–35 × 4–5 μ; pycnidiis globosis, glabris, 200–300 μ, conidiis hyalinis, continuis, oblongis, 6–8 × 1½ μ.

In caulibus mortuis *Thalictri sparsiflori*, Minnehaha, Colorado, Augusto, 1900.

Pleosphaeria Lithospermi

Peritheciis sparsis, superficialibus, submembranaceis, globosis, deinde collabentibus, minute papillatis, extus pilis simplicibus, septatis, brunneis 150 × 4–5 μ obsitis, sed vertice nudis, 250 μ diam.; ascis octosporis, late clavato-oblongis, paraphysatis, iodo non caerulescentibus, 120–140 × 20–25 μ; sporis monostichis vel distichis, oblongo-ellipticis, luteo-brunneis, 7-septatis, loculis 2–3-septatis, ad septum medium valde constrictis, ad alia leniter constrictis, 25–30 × 14–15 μ.

Ad caules mortuos *Lithospermi parviflori*, 'Cross Ruxton, Minnehaha, Septembri, 1900.

Tichosporium (Sacc.)

Perithecia sparsa vel gregaria, superficialia vel basi immersa, sphaeroidea vel ovata, ostiolo papillari vel inconspicuo, coriacea vel carbonacea, atra, glabra. Asci cylindracei vel clavati, typice 8-spori. Sporidia elliptica vel oblongata, murali-divisa, hyalina. Paraphyses graciles aut parum notabiles.

Tichosporium Edwiniae

Peritheciis copiosis, superficialibus, ad basim innatis, submembranaceis, depresso-globosis, deinde cupulate collabentibus, glabris, vix ostiolatis vel vere astomatis, rima apicali dehiscentibus,

* Species hic inventae in statu vivo descriptae, et in pigmento aqua diluto pinctae sunt. Colorum nomina Saccardii Chromotaxiae sunt. Typi omnium specierum generumque in herbario meo conservantur.

nigris, 175–300 μ diam.; ascis octosporis, late oblongis, membrana crassa, vix vel non caerulescentibus, 60 × 12–14 μ; sporis oblique monostichis, oblongo-ovatis, hyalinis, 4–6-septatis, saepius 5-septatis, loculis, terminalibus exceptis, 1-divisis, ad septa distincte constrictis, 20–22 × 8–10 μ.

Ad ramos decorticatos *Edwiniae Americanae*, Minnehaha, Septembri, 1900. *Tichosporium* est *Teichosporella* Sacc., sectio *Teichosporae* (*Strickeriae*). *Teichosporella* verbum hybridum est, itaque ad *Tichosporium* corrigenda.

Mycosphaerium lineatum *

Peritheciis gregariis, in lineis longis vel maculis elongatis elevatis nigris dense dispositis, innatis, epidermide tectis, deinde suberumpentibus, conico-sphaericis, vix vel non papillatis, glabris, subiculo sparso brunneo insidentibus, minutis, 100 μ diam.; ascis octosporis, clavatis, brevibus, aparaphysatis, iodo non caerulescentibus, 60 × 12–15 μ; sporis irregulariter dispositis, ovato-oblongatis, uniseptatis, hyalinis, levibus, intus minute granulosis, 16 × 6–8 μ: nomen propter perithecia lineatim disposita.

Ad caules emortuos *Pedicularis procerae*, Dark Cañon, Julio, 1900. Est *M. trichophila* (Karst.) nuda; *M. Tassianae* (DeNot.) Johan. affinis.

Phorcys minutus

Peritheciis solitariis, copiosis, raro subgregariis, primitus tectis, deinde epidermidem nigricantem pertusis, submembranaceis, depresso-globosis, ostiolo depresso, rugulosis, atro-brunneis, minutis, 85–150 μ diam.; ascis 6–8-sporis, irregulariter clavatis, brevibus, ad basim attenuatis, 80 × 16–18 μ; paraphysibus linearibus, paucis; sporis monostichis, sursum distichis, oblongo-ellipticis, uniseptatis, ad septum constrictis, levibus, brunneis, biguttatis, 13–16 × 6–7 μ: nomen propter perithecia minuta.

Ad folia vetusta exsiccataque *Yuccae glaucae*, 'Cross Ruxton, Septembri, 1900.

Metasphaeria Opulastri

Peritheciis sparsis, erumpentibus, nudis, globosis, vix ostiolatis, brunneis, 200–300 μ; ascis octosporis, clavatis, iodo non caerulescentibus, 60–75 × 10 μ; paraphysibus clavulatis, hyalinis, 2–3 μ lat. ad apicem; sporis fusiformibus, acutis, plerumque 3-septatis, rectis vel curvulis, hyalinis, 22–25 × 3–4 μ.

Ad ramulos vetustos *Opulastri monogynae*, Minnehaha, Septembri, 1900.

* Pro *Mycosphaerella* Johan., nomine hybrido.

Leptosphaeria Castilleiae

Peritheciis copiosis, numerosis, primitus tectis, deinde erumpenti-superficialibus, globosis, ostiolatis, vix conicis vel papillatis, glabris, 150–200 μ; ascis octosporis, oblongis, paraphysatis, iodo non caerulescentibus, 80–100 × 8–10 μ; sporis distichis, fusiformibus, 3–4-septatis, curvulis, raro rectis, acutis vel obtusis, ad septa leniter vel non constrictis, fusco-flavis, 40–50 × 4 μ; pycnidiis globosis, 100–150 μ, basidiis 10 × 1 μ, conidiis oblongis, hyalinis, 6–8 × 2 μ.

Ad caules emortuos *Castilleiae pallidae*, Ruxton Park, Septembri, 1900. A *L. Ogilviense* (B. & Br.) Ces. differt sporis 3–4-septatis, enucleatis, peritheciis erumpentibus, non papillatis; a *L. concinna* Ell. & Ev. peritheciis epapillatis, erumpentibus, sporis majoribus.

Pleospora Edwiniae

Peritheciis sparsis, tectis, deinde cortice dejecto superficialibus, depresso-globosis, ostiolatis, vix vel non papillatis, magnis, 500–600 μ; ascis 4–6-sporis, clavatis, iodo non vel indistincte caerulescentibus, 100–120 × 15 μ; paraphysibus numerosis, linearibus, ascos valde superantibus; sporis recte monostichis, late ellipticis, 4-, saepius 5-septatis, uno septo verticale in omne loculo, ultimis saepe exceptis, ad septa leviter constrictis, ad secundum semper valde constrictis, fusco-brunneis, 20–25 × 12–14 μ.

Ad ramos siccatos *Edwiniae Americanae*, Sugar Loaf, Septembri, 1900.

Pleospora sepulta

Peritheciis subcopiosis, sepultis sub epidermide rotundato-elevata vel hysteroidea, globosis, vix ostiolatis, carbonaceis, glabris, magnis, 400–500 μ; ascis 6–8-sporis, clavato-cylindraceis, iodo non caerulescentibus, paraphysibus linearibus, simplicibus, valde torulosis, apice 4 μ lat.; sporis oblongo-fusiformibus, oblique monostichis, utrinque attenuato-acutis, 8–11-, plerumque 9–10-septatis, septo verticale uno, nonnunquam duobus, ad medium constrictis, in aetate disintegratis, flavis dein brunneis, 30–45 × 10–14 μ.

Ad ramos ignotos vetustos decorticatosque, Minnehaha, Septembri, 1900.

Psilothecium

Apothecia superficialia, sessilia, ceraceo-coriacea, cupulato-hemisphaerica, nuda, nigra, minuta; epithecium nullum vel obsolescens, paraphyses lineares, simplices, hyalinae; hymenium laeticolore; hypothecium plectenchymaticum, crassum, pallide fuscum;

excipulum carbonaceum, crassum, glabrum vel tuberculatum, brunneo-nigrum, margine libero incurvo. Asci octospori, clavati, iodo non tincti. Sporae continuae, hyalinae, ellipticae, leves. Nomen propter epithecium obsoletum, *ψιλός*, nudus, *θηκεῖον, τό*, hymenium. *Patinellae* affinis, sed differt paraphysibus simplicibus, epithecio nullo hymenioque laeticolore.

Psilothecium incurvum

Apotheciis superficialibus, sessilibus, gregariis, ceraceo-coriaceis, oblato-hemisphaericis, 400–700 *μ* lat., 300–400 *μ* alt.; hymenio pallide brunneo vel isabellino, 125 *μ* alt., paraphysibus linearibus, simplicibus, superne vix vel haud incrassatis, hyalinis, 2 *μ* lat.; hypothecio plectenchymatico, pallide isabellino 125 *μ* alt.; excipulo isabellino, sub micr. nigro-carbonaceo, cellulis 6–8 *μ* diam. extus crebro minuteque tuberculatis, infra 50 *μ* cr., margine libero, incurvo, 25 *μ* cr.; ascis octosporis, clavatis, stipitatis, iodo non tinctis, 70–80 × 10 *μ*: sporis recte vel oblique monostichis, ellipticis, hyalinis, levibus, 8–9 × 4 *μ*: nomen specificum propter marginem longe incurvum.

Ad lignum udum decorticatumque *Salicis chlorophyllae*, Placer, montibus Sangre de Christo, Julio, 1896.

Stictis Edwiniae

Apotheciis tectis, globoso-clausis, dein erumpentibus, ore orbiculare, late apertis, extus nigro-furfuraceis vel tuberculatis, hymenio griseo, 300–500 *μ*; ascis octosporis, clavatis, iodo omnino caerulescentibus, 50–60 × 5–6 *μ*; paraphysibus linearibus, 2 *μ* lat.; sporis linearibus, hyalinis, plerumque guttulatis, 6–7-septatis, curvulis vel saepius sigmatodibus, 30–40 × 2–3 *μ*.

In ramis corticatis *Edwiniae Americanae*, Sugar Loaf, Septembri, 1900.

Ophiogloea

Apothecia superficialia, sessilia, gelatinosa, olliformia, extus atro-excipulata, hymenio laeticolore; epithecium nullum; hypothecium plectenchymaticum, crassum, hyalinum, iodo caerulescens; excipulum parenchymaticum, ad basim praecipue crassum, atro-avellaneum. Asci octospori, lineares, perlongi. Paraphyses simplices, longe clavulatae, fere hyalinae. Sporae filiformes, parallele congestae, aetate septulatae, hyalinae. Nomen propter formam sporarum textumque apothecii, *ὄφις, ὄφιος, ὁ*, anguis, *γλοιά, ἡ*, gluten.

A *Holwaya* differt forma cupulae excipuloque, ab *Agyriopside* excipulo, a *Bactrospora*, *Lahmia* et *Mycobacidia* contextu epithecioque, a *Gorgonicipe* excipulo parenchymatico.

Ophiogloea linospora

Apotheciis superficialibus, sessilibus, gelatinosis, olliformibus, subgregariis, hymenio convexo, griseo, 500–800 μ alt., excipulo atro-avellaneo, parenchymatico, ad basim 125–150 μ cr., intus cellulis pallidis, oblongo-polygonatis, 20–25 μ diam., extus cellulis globosis nigris, 8–10 μ, pilis septatis concoloribus, 50–100 × 5 μ praeditis, 0.5–1.5 mm. lat.; ascis octosporis, perlinearibus, infra valde attenuatis, iodo non tinctis, 330–350 × 5–6 μ; hypothecio hyalino, iodo pulchre caerulescente, 80 μ cr.; sporis parallele congestis, filiformibus, hyalinis, deinde septulatis, maturitate expulsis varie curvatis et ad hymenium dense intertextis, 300–325 × 1–2 μ: nomen propter sporas perlineares.

Ad lignum decorticatum putridumque *Aceris glabri* (?), Fir Glen, Minnehaha, Septembri, 1900.

Scytopezis

Apothecia superficialia, sessilia, ceraceo-coriacea, hemisphaerico-cupulata, atra, pilosa, margine stellatim fisso; epithecium nullum; paraphyses praesentes; excipulum crassum, nigro-brunneum, pseudoparenchymaticum, pilis longis, atris dense obsitum; hypothecium crassum, hyalinum, prosenchymaticum. Asci octospori, cylindracei, inoperculati, iodo tincti. Sporae continuae, hyalinae, ellipticae, leves. Nomen propter texturam apothecii, *σκύτος, τό*, corium, *πέζις, ἡ*, fungus sessilis.

Est *Urnula* estipitata, excipulo parenchymatico.

Scytopezis stellata

Apotheciis sessilibus, caespitosis, hemisphaerico-cupulatis, margine incurvo, in 6–8 lobos alte stellatim fisso, hymenio umbrino-atro, paraphysibus 1–3-ramosis, septatis, apice dilute umbrinis, vix incrassatis, 3 μ lat., 1 cm. lat. et alt.; excipulo nigro-tomentoso, cellulis brunneis, 10–12 × 20 μ seriatim dispositis, ad marginem fuscioribus minoribusque in pilos confertos, contortos, septatos umbrinos, plerumque simplices, 250–350 × 4 μ productis, 150–250 μ crasso; hypothecio hyphis hyalinis 4–6 μ intricate intertextis, 400 μ cr.; ascis octosporis anguste cylindraceis, longe stipitatis, inoperculatis, non-iodatis, 350 × 12 μ; sporis recte monostichis, ellipticis, levibus, hyalinis, 22 × 11 μ: nomen propter marginem stellatim fissum.

Ad ramum vetustum in terra muscosa sepultum, Minnehaha, Septembri, 1902.

Dermatea macrospora

Apotheciis sparsis, numquam caespitosis, sessilibus, innato-erumpentibus, cortice elevata marginatis, ceraceo-coriaceis, scutel-

latis vel disciformibus, 0.8–1.2 mm. diam.; epithecio distincto, tenui, brunneo, hymenio brunneo-fulvo, 150 μ cr., paraphysibus linearibus, vix clavulatis, parce ramosis, insuper dilute fulvis, 3 μ lat.; hypothecio prosenchymatico, fere parenchymatico, fulvo, 100 μ cr.; excipulo cum hypothecio continuo similique, pallide fulvo, extus pilis fasciculatis ochraceis 100 × 5 μ minute tuberculato, margine libero, elevato, lobato; ascis octosporis, late clavato-oblongis, non-stipitatis, iodo non-tinctis, sporis farctis, 110–130 × 25–30 μ; sporis crebro et irregulariter distichis, raro oblique monostichis, elliptico-oblongis, rectis vel curvulis, levibus, intus granulatis, hyalinis, 33–45 × 8–12 μ.

Ad lignum *Salicis*, Placer, montibus Sangre de Christo, Julio, 1896. *D. inclusae* Peck affinis, sed colore, sporis majoribus margineque differt.

Helotium marginatum

Apotheciis stipitatis, gregariis, ceraceis, scutellatis, hymenio exacte ochraceo, ½–1 mm. lat., paraphysibus linearibus, septatis, hyalinis, 2 μ lat.; excipulo glabro, cellulis fusiformibus, brevibus, ochroleuco, margine pallidiore; stipite ceraceo, crasso, aequali, sparse albo-piloso, albido-ochroleuco, 300 μ alt. et lat.; ascis octosporis, clavulatis, stipitatis, iodo leviter tinctis, 100–110 × 8–10 μ; sporis monostichis vel irregulariter distichis, elliptico-fusiformibus, rectis vel curvulis, levibus, hyalinis, plerumque guttulatis, 16–18 × 4–5 μ: nomen propter marginem pallidum.

Ad ramos corticatos *Salicis*, placer, montibus Sangre de Christo, Julio, 1896. *Helotio carpinicolae* Rehmet *H. Ostruthii* (Saut.) Sacc. affinis.

Allophylaria Senecionis

Apotheciis superficialibus, stipitatis, laxe gregariis, ceraceo-coriaceis, subdiaphanis, cupulatis, glabris, ochroleucis, cellulis excipuli linearibus, 50–75 × 5 μ, margine irregulariter crenulatis, 500–800 μ lat.; stipite glabro, aequali, ochroleuco, in cupulam abrupte eunte, 200–400 μ alt., 100 μ lat.; ascis octosporis, linearibus-clavatis, stipitatis, iodo non tinctis, 50 × 5–6 μ; paraphysibus lineari-subclavulatis, hyalinis, 2 μ lat.; sporis distichis, oblongo-fusiformibus, levibus, plerumque rectis, hyalinis, 10–12 × 2–3 μ.

In caulibus emortuis *Senecionis blitodis*, Mount Garfield, Augusto, 1901. Est *A. nanae* affinis, sed forma coloreque differt.

Dasyscypha incarnata

Apotheciis breviter stipitatis, sparsis, ceraceis, primitus globoso-clausis, dein hemisphaerico-apertis, extus pallide incarnatis, sparse pilosis, ad marginem dense lanatis ciliatisque, pilis strictis, septatis,

hyalinis, parallelis, 80–100 × 2–3 μ, deorsum brevioribus, ad stipitem ramoso-tortuosis, hymenio laete incarnato, 1/3–1 mm. diam.; stipite pallidiore, 1/3 mm. alt.; ascis octosporis, oblongis, late stipitatis, iodo caerulescentibus, 50–60 × 4 μ; paraphysibus linearibus, simplicibus, numerosis, parce septatis vel continuis, granulis seriatis citrinulis praeditis, 2–3 μ; sporis distichis, oblongis, rectis vel curvulis, hyalinis, 8–10 × 1½–2 μ: nomen propter hymenium incarnatum.

Ad lignum decorticatum *Piceae Engelmannii*, Dark Cañon, Septembri, 1900. Ad *D. subtilissimam* (Cooke) Sacc. spectat.

Dasyscypha rubrifulva

Apotheciis superficialibus, sessilibus, gregariis, carnoso-ceraceis, globoso-cupulatis, siccitate clausis, udis apertis, extus praecipue margine laete fulvis, aetate brunneis, hymenio luteo, ochroleuco vel cremeo, pilis simplicibus, strictis, continuis, plerumque dense et minute tuberculatis, lilaceis vel purpureis, raro rubro-brunneis, 100–150 × 2–3 μ densissime praeditis, 1/3–1 mm. diam.; ascis octosporis, oblongis, brevioribus, iodo non caerulescentibus, 80 × 10 μ; paraphysibus linearibus, simplicibus, 2 μ lat.; sporis distichis, botuliformibus, utrinque obtusis, valde curvatis, levibus, hyalinis, intus minute granulosis, 16–18 × 4 μ: nomen propter apothecii colorem.

In ramis vetustis ignotis, Minnehaha, Septembri, 1900.

Neottiopezis macrospora*

Apotheciis sessilibus, cupuliformibus, aquose carnosis, udis fere hygrophanis, extus obsolete micaceis, tomentosis, incarnatis, hymenio concolore, margine distincto, pallidiore, crenulato-dentato, 3–6 mm. lat. et alt.; paraphysibus linearibus vel clavulatis, septatis, clava 5–8 μ lat., insuper granulis brunneis minutis farctis; hypothecio hyalino, 200 μ cr., pseudoparenchymatico; excipulo ad marginem exacte pseudoparenchymatico, 150 μ cr., cellulis 20 μ diam., pilis brevibus, septatis, curvatis, hyalinis, 50–80 × 8 μ praedito; ascis octosporis, cylindraceis, stipitatis, operculatis, iodo non tinctis, 350 × 22 μ; sporis oblique monostichis, raro distichis, naviculatis, leviter asperatis, dense vacuolatis, 40–42 × 16–18 μ: nomen propter sporas permagnas.

Ad terram inter muscos udos, Jack Brook, Minnehaha, Augusto, 1899.

Scutellinia chaetoloma

Apotheciis superficialibus, gregariis, ceraceo-carnosis, cupuliformibus, saepe irregulariter cochleatis, griseis, extus pilis sparsis, acutis, brunneolis, 270 × 8 μ, margine longe ciliato pilis erectis,

* Pro *Neottiella* Cooke, nomine hybrido: πέζις, ἡ, fungus sessilis.

strictis, fasciculatis, septatis, pallide brunneis, 560 × 8 μ, hymenio albido vel griseo, 5–22 mm. lat. et 6–10 mm. alt.; paraphysibus linearibus, vix clavulatis, raro bifurcatis, 3 μ lat.; ascis octosporis, cylindraceis, 300 × 19 μ; sporis monostichis, ellipticis, levibus, vacuolatis, 25–27 × 12–13 μ: nomen propter pilos marginis longos fasciculatosque, χαίτη, ἡ, coma, λῶμα, το, lacinia.

Ad lignum udum et ad acus *Piceae*, Jack Brook, Minnehaha, Augusto, 1899.

Scutellinia dispora

Apotheciis sparsis, ceraceo-carnosis, scutellatis, margine setis brunneis brevibus, attenuatis, 200 × 20 μ praedito, extus pilis similibus brevioribus, disco miniato-rubro, 3–4 mm. diam.; paraphysibus linearibus, ad apicem valde turgidis, granulis coccineis dense farctis, 10–12 μ cr.; ascis octosporis, clavulatis, 185 × 20–23 μ; sporis irregulariter dispositis, levibus, hyalinis, gutta magna praeditis, forma valde diversis, aliis late ellipticis, 23–25 × 17–19 μ, aliis sphaericis, 23–27 μ, frequenter formis duabus in asco unico: nomen propter sporas diversas.

Ad lignum udum muscosumque, Cheyenne Cañon, Colorado Springs, Julio, 1894.

Scutellinia heterospora

Apotheciis sessilibus, gregariis, scutellatis, hymenio miniato, extus concoloribus, pilis acutis, septatis, atro-brunneis, 300 × 20 μ, margine pilis longissimis acuminatis, septatis, 1,000 × 27 μ, brunneo-ciliato, 3 mm. lat.; paraphysibus clavulatis, septatis, granulis aurantiaceis fusiformibus farctis, 4 μ lat., clava aurantiacea, 8–10 × 20–25 μ; ascis octosporis, late cylindraceis, breviter stipitatis, 275 × 20 μ; sporis monostichis, diversis, quattuor majoribus, ellipticis, asperulatis, vacuolatis, 24 × 14 μ, quattuor minoribus, fere vel exacte sphaericis, hyalinis, levibus, 11 μ diam.: nomen propter sporas dissimiles.

Ad terram muscosam, Minnehaha, Augusto, 1899.

Scutellinia irregularis

Apotheciis sessilibus, gregariis, irregulariter cupulatis, demum concavis, hymenio griseo-albido, fere glaucescente, extus brunneo-griseis, pilis brunneis, 100 × 8 μ, margine pilis strictis, septatis, 325 × 8 μ brunneo-ciliato, 4–10 mm.; paraphysibus clavulatis, septatis, 3 μ lat.; ascis octosporis, cylindraceis, 200 × 16 μ; sporis monostichis, ellipticis, asperatis, biguttatis, 15 × 8 μ: nomen propter formam apothecii.

Ad trabes putrescentes *Piceae* sub ponte, Jack Brook, Minnehaha, Augusto, 1899. *S. Jungneri* Henn. affinis.

Sepultaria heterothrix

Apotheciis sepultis, ore integro, demum emergentibus et ore in dentes triangulares findente, hymenio ochraceo-brunneo, extus brunneis, pilis brevioribus, simplicibus, flexuosis, septatis, 100–150 μ long., longioribus similibus, nonnumquam 1-ramosis, 700–1000 μ, 2–2.5 cm. lat., 2 cm. alt.; paraphysibus clavulatis, septatis, vix granulatis; ascis lineari-clavatis, octosporis, 216 × 19 μ; sporis oblique monostichis, late ellipticis, levibus, uniguttatis, 20 × 14 μ: nomen propter pilos excipuli diversos.

In terra foliosa populeti, Ruxton Park, Augusto, 1899. *S. Geasteri* (B. & Br.) affinis.

Macropodia urceolata

Apotheciis carnosis, cupulatis, stipitatis, stipite in radiculas tres vel quattuor 5–10 mm. long. abeunte, omnino vel deorsum densissime griseo-lanato, hymenio ochraceo-brunneo, extus concoloribus vel fuscioribus, furfuraceo-tuberculatis, cellulis tuberculorum trigonorum in fasciculos pilorum brevium hyalinorum productis, margine pallidiore, incrassato, lacerato crenatoque, 1–2.5 cm. lat., 5–15 mm. alt.; paraphysibus clavulatis, septatis, viridi-guttatis, 4 μ lat., clava 8–9 μ lat.; ascis octosporis, cylindraceis, breviter stipitatis, 325 × 22 μ; sporis oblique monostichis, ellipticis, levibus, hyalinis, 24×14 μ: nomen propter formam apothecii.

In arena aquosa, Jack Brook, Minnehaha, Augusto, 1899.

Humaria ochroleuca

Apotheciis sessilibus, solitariis, urceolatis vel cupulatis, demum nonnumquam convexo-expansis, ceraceo-carnosis, hymenio ochroleuco, 3–6 mm. lat., 2–6 mm. alt., paraphysibus linearibus, hyalinis, numerosis, 3 μ lat.; hypothecio hyalino, hyphis dense intertextis, 170 μ cr.; excipulo ochroleuco, 125 μ cr., ex cellulis rotundis vel polygonatis, saepe seriatis, 16–20 μ diam., concreto, minute micaceo vel glabro, margine eximie albido-crenulato, sub margine zona pallide brunnea; ascis octosporis, linearibus, longe stipitatis, iodo non tinctis, 270 × 11 μ; sporis irregulariter monostichis, ellipticis, levibus, hyalinis, 19 × 11 μ: nomen propter colorem apothecii.

Inter muscos et in glarea ripis udis, Engelmann Cañon, Augusto, 1895, Breckenridge, Augusto, 1896, Jack Brook, Minnehaha, Augusto, 1899. *H. subcrenulatae* Clem. affinis.

Plicaria chlorophysa

Apotheciis sessilibus, solitariis, carnosis, cupuliformibus, raro concavo-expansis, hymenio brunneo, extus ochraceo-brunneis,

furfuraceo-tuberculatis, margine integro, 5–12 mm. lat., 3–4 mm. alt.; paraphysibus clavatis, septatis, clava saepe granulis olivaceiviridibus farcta, 11 μ lat., nodis regulariter in cellulis magnis, sphaericis vel clavatis tumidis; ascis octosporis, cylindraceis, 275 × 16 μ; sporis monostichis, ellipticis, levibus, hyalinis, 18 × 11 μ: nomen propter colorem clavae paraphysium.

Ad lignum udum vetustumque, Jack Brook, Augusto; ad fimum udum, Castle Cañon, Septembri, 1900. *P. fimeti* (Fuckel) Rehm affinis.

Heteroplegma

Apothecia superficialia, sessilia, carnosa, hemisphaerico-cupulata, furfuraceo-excipulata, magna; epithecium nullum; paraphyses praesentes; hypothecium percrassum, hyalinum, trilaminatum, lamina superiore et inferiore pseudoparenchymaticis, medullari hyphis parallelis intertextisque, tramitiforme; excipulum tenue, filis brevibus tomentosum. Asci octospori, cylindracei, iodo valde caerulescentes. Sporae continuae, hyalinae, ellipticae. Nomen propter hypothecium laminatum, ἕτερος, dissimilis, πλέγμα, τό, vimineum.

Est *Plicaria* hypothecio heteromorpho.

Heteroplegma caeruleum

Apotheciis sessilibus vel substipitatis, solitariis vel dense gregariis, cupulatis vel urceolatis; ore clauso, dein late aperto, carne lacte caerulescente succosa, pulchre caerulea, ad basim 2–5-sulcatis, hymenio laete olivaceo, paraphysibus clavatis, septatis, insuper olivaceis, 4–5 μ lat., 5–8 cm. lat., 3–6 cm. alt.; hypothecio duabus lamellis pseudoparenchymaticis, fibrillis hypheis connexis composito, crasso; excipulo cremeo-olivaceo ad basim pulcherrime caeruleo, tuberculis fibrosis minutis isabellinis tomentoso; ascis octosporis, linĕari-cylindraceis, stipitatis, iodo omnino caerulescentibus, 275–300 × 12–15 μ; sporis oblique vel irregulariter monostichis, ellipticis, asperatis, hyalinis, 18–20 × 8–9 μ: nomen propter colorem lactis.

Ad terram udam umbrosamque, Dark Cañon, Septembri, 1899.

Heteroplegma crenatum

Apotheciis sessilibus, plerumque solitariis, aquose carnosis, irregulariter hemisphaerico-cupulatis, hymenio umbrino-castaneo, paraphysibus clavulatis, simplicibus, dilute umbrinis, apice 5 μ lat., 2.5–5 cm. lat., 2–3 cm. alt.; excipulo cellulis polygonis minutis hyphis intertextis tomentoso, pallide umbrino, siccitate griseo-furfuraceo, 150 μ cr., margine crenis nigro-furfuraceis, 4 mm. lat.,

2 mm. alt., praedito; hypothecii lamina superiore inferioreque 600 μ crassa, medullari 500 μ; ascis octosporis, cylindraceis, truncatis, operculatis, operculo et ore iodo valde tinctis, alibi dilute coloratis, 300 × 28 μ; sporis oblique vel irregulariter monostichis, ellipticis, levibus, hyalinis, 22 × 14 μ: nomen propter marginem crenatum: typus!

Ad terram pinguem udosamque inter muscos, Ruxton Brook, Minnehaha, Augusto, 1902.

Phleboscyphus* macropus

Apotheciis stipitatis, solitariis, ceraceo-carnosis, pileatis, sed ad centrum excavatis, hinc umbilicatis, hymenio umbrino, subtus minute scabris, griseo-albidis, 3–4 cm. lat., 1 cm. alt.; excipulo pseudoparenchymatico, pallide umbrino, cellulis oblongo-polygonatis, fere seriatis, 20 × 30 μ composito, 100 μ crasso, ad marginem in pilos breves torulosos septatos 25–50 μ abeunte, margine castaneo-crenulato; hypothecio crasso, hypheo-parenchymatico, hyalino, 800 μ cr.; stipite solido, longo, ceraceo-cartilagineo, compresso, alte 3–4-sulcato, supra valde incrassato, scabro, albido-cremeo, 4 cm. long., infra 7 mm. lat., insuper 2 cm. lat., sulcis 2–3 mm. alt. et cr.; excipulo ut in apothecio, sed cellulis oblongioribus, exacte seriatis, 150–175 μ cr., acie pilis sparsis fuscata; interiore dense pseudoparenchymatica; ascis octosporis, elongato-cylindraceis, stipitatis, inoperculatis, iodo non tinctis, 300 × 20 μ; paraphysibus clavulatis, simplicibus, septatis, clava umbrina, 9 μ lat.; sporis irregulariter monostichis, late ellipticis, levibus, hyalinis, gutta magna 12–13 μ praeditis, 20–22 × 12–14 μ: nomen propter stipitem longum.

Ad terram udam in antro saxoso, Ruxton Brook, Minnehaha, Septembri, 1902: a *P. acetabulo* (L.), differt praecipue stipite longiore et apothecio umbilicato tomentosoque.

Phleboscyphus olivaceus

Apotheciis stipitatis, caespitosis, irregulariter cupuliformibus, deinde laceratis, latis, hymenio viridi-olivaceo, valde corrugato-sulcato vel papillato, extus brunneo-olivaceis, furfuraceo-tuberculatis, margine fusciore, 4–5 cm. lat., 2–2.5 cm. alt.; stipite lato, similiter furfuraceo coloratoque, 1–2-sulcato, infra mycelio obsito, coalito, 2–2.5 cm. alt., 1.5–2 cm. lat.; ascis octosporis, anguste cylindraceis, breviter stipitatis, iodo tinctis, 350 × 14 μ; paraphysibus linearibus, septatis, hyalinis, 3–4 μ lat.; sporis mono-

* *Acetabula* Fr. 1823, Fckl. 1869, propter *Acetabulum* L. 1735 concidit. *Phleboscyphus* (φλέψ, φλεβός, ἡ, vena, σκύφος, ὁ, calix, propter venas apothecii) pro *Paxina* O. K., nomine hybrido, praepositum est.

stichis, ellipticis, asperatis, hyalinis, 19 × 8 μ; nomen propter colorem apothecii.

Ad terram udam, Jack Brook, Minnehaha, Augusto, 1899.

Phleboscyphus radicatus

Apotheciis stipitato-radicatis, solitariis, ceraceo-carnosis, fere cartilagineis, urceolatis vel cupulatis, hymenio ochroleuco, ad basim 3–4-sulcato-corrugato, extus concoloribus, furfuraceo-tuberculatis, 1–2 cm. alt., 1–2 cm. lat.; excipulo indistincte parenchymatico, cellulis irregularibus, polygonato-rotundis, ad marginem in grumos 50 × 35 μ, vel in pilos fasciculatos hyalinos 80 μ long. productis, 100 μ crasso; hypothecio pseudoparenchymatico, percrasso, 800–1000 μ cr.; ascis octosporis, cylindraceis, stipitatis, non-iodatis, inoperculatis, 275 × 16 μ; paraphysibus 1–2-ramosis, septatis, vix clavulatis, apicem fuscatis, 4–5 μ lat.; sporis recte vel oblique monostichis, ellipticis, levibus, biguttatis, 20–22 × 10–11 μ; stipite brevissimo, 5–6 mm. alt. × 4 mm. lat., hypogaeo vel subhypogaeo, lacunoso, in fibris densis producto, radice simili: nomen propter stipitem radicatum.

In locis udis sub saxis, Ruxton Brook, Minnehaha, Septembri, 1902.

Helvella pileata

Apotheciis solitariis, ceraceo-carnosis, campanulato-pileatis vel verpiformibus, vix vel haud lobulatis, levibus, umbrinis, subtus levibus, albido-tomentulosis, formis campanulatis 1 cm. alt., 2 cm. lat., verpiformibus 4 cm. alt., 2.5 cm. lat.; hypothecio hypheo-parenchymatico, 250 μ cr.; excipulo hyalino, pseudoparenchymatico, cellulis oblongis, exacte seriatis, 25–30 × 15–18 μ, ad marginem in pilos continuos hyalinos 30–50 × 5–7 μ productis, 125 μ lat.; stipite albo, elongato, levi, tomentuloso, farcto-subsolido, 6–8 cm. alt. × 3–7 mm. lat., excipulo seriatim parenchymatico, sed cellulis ad marginem in grumis 45 × 25 μ coacervatis, 200 μ cr., interiore trilaminata, lamella prima hyphis dense et intricate intertextis, 400 μ lat., secunda hyphis parallelis congestis, 250 μ cr., medullata hyphis septatis strictis 3–4 μ lat., laxissime intertextis; centro cavo, 2 mm. lat.; ascis octosporis, cylindraceis, non-stipitatis, inoperculatis, non-iodatis, 275 × 20 μ; paraphysibus clavatis, parce ramosis, septatis, 4–5 μ lat., clava dilute umbrina, 8–10 μ lat.; sporis plerumque oblique monostichis, late ellipticis, levibus, hyalinis, gutta magna 10 μ praeditis, 20 × 14 μ: nomen propter formam apothecii.

Ad terram et lignum udum, Jack Brook, Minnehaha, Septembri, 1902.

New Species of Fungi

By Charles H. Peck

Lepiota eriophora

Pileus thin, dry, broadly convex or nearly plane, densely squamose with brown rather compact and sometimes pointed woolly scales, flesh white; lamellae thin, narrow, close, free, whitish, becoming darker with age or in drying; stem equal, hollow, clothed with brown tomentum; spores minute, 4 μ long, 2–2.5 μ broad, often adhering together in small groups or masses and then appearing like unequal angular spores.

Pileus about 2.5 cm. broad; stem 2–3 cm. long, 2–3 mm. thick.

West Virginia. C. G. Lloyd. This species resembles *L. felina* and *L. fuscosquamea*, from both of which it differs in its smaller spores and more dense and paler tomentose veil.

Marasmius subpilosus

Pileus thin, even or faintly rugulose in the center, striate on the margin, pruinosely pubescent, convex or nearly plane, sometimes slightly umbilicate, whitish, often tinged with yellow or brown in the center; lamellae rather broad, ventricose, adnate, subsinuate, white, the edge minutely ciliate; stem slender, tough, stuffed or hollow, pruinosely pubescent, grayish tomentose at the base; reddish brown, white at the top.

Pileus 1–2 cm. broad; stem 2.5–5 cm. long, 0.5–1 mm. thick.

Among fallen leaves and twigs in moist woods. Near Moscow Mountains, Idaho. Autumn. L. F. Henderson. This species is well marked by the pubescence of the pileus and stem but the hairs are so minute and thinly placed that to the naked eye they appear like a mere pruinosity, but under a strong lens they are readily seen and also the cilia of the edge of the lamellae.

Pholiota fulvosquamosa

Pileus fleshy, rather thin, convex becoming nearly plane, dry, adorned with numerous appressed tawny or brownish fibrillose scales, concentrically cracked about the disk, flesh white, becoming brownish where cut, taste and odor of radishes; lamellae nar-

row, close, attenuated toward the stem and attached to a narrow collar, whitish becoming pinkish cinnamon; stem equal, rigid, stuffed or hollow, adorned below with numerous erect subfloccose tawny scales, glabrous above and a short distance below the ample persistent annulus which is white above and tawny floccose squamulose below; spores elliptic, 8 μ long, 4–5 μ broad.

Pileus 6–12 cm. broad; stem 5–8 cm. long, 8–10 mm. thick.

About the base of oak trees. Agricultural College, Michigan. September. B. O. Longyear.

Flammula velata

Pileus fleshy, thin toward the margin, convex, moist, sulphur yellow, reddish or orange in the center, the margin persistently incurved, flesh yellow or greenish yellow, taste mild; lamellae arcuate, adnate or slightly decurrent, 5 mm. wide, pale yellow, becoming rusty brown or snuff-color with age, concealed when young by the conspicuous but thin somewhat webby yellowish white veil; stem short, slender, flexuous, solid, fibrillose, sulphur yellow above, brownish below, somewhat tomentose at the base; spores elliptic, 5–8 μ long.

Pileus 2–4 cm. broad; stem 2.5–4.5 cm. long, 2–4 mm. thick.

Woods along small streams. Base of Moscow Mountains, Idaho. July. L. F. Henderson. The strongly developed veil is a prominent character of this species. Its moist pileus places it in the section *Uda*.

Cortinarius punctifolius

Pileus fleshy, thin on the margin, convex or nearly plane, dry, slightly fibrillose and squamulose, yellowish brown, sometimes tinged with green, flesh yellow; lamellae broad, subdistant, deeply and abruptly excavated at the inner extremity, adnexed or nearly free, yellowish brown tinged with green, becoming cinnamon-color, dotted with yellow; stem subequal, often flexuous or irregular, glabrous or slightly fibrillose, striate, yellow, varied with bluish green; spores broadly elliptic or subovate, 5–7 μ long, 4–5 μ broad.

Pileus 2.5–6 cm. broad; stem 2.5–5 cm. long, 5–10 mm. thick.

Woods at the base of Moscow Mountains, Idaho. Summer. L. F. Henderson. A peculiar species well marked by the yellowish dots of the lamellae, a character that has suggested the specific name. The species belongs to the section *Dermocybe*.

Bolbitius Glatfelteri

Pileus thin, conical or subcampanulate, soon expanding with the margin curving upwards, sometimes umbonate, glabrous, very viscid, widely striate on the margin, white, yellowish or tawny in the center; lamellae close, rather narrow, subventricose, free, pallid, becoming ferruginous and pulverulent; stem equal or slightly tapering upward, hollow, slightly striate above, slightly squamulose or furfuraceous when young, becoming glabrous and shining, pure white; spores 12–16 μ long, 8–10 μ broad.

Pileus 2–3 cm. broad; stem 5–10 cm. long, 4–5 mm. thick.

Gregarious or cespitose on rotted manure. Missouri and Illinois. April and May. N. M. Glatfelter. The species is apparently related to *B. sordidus* Lloyd, from which it may be separated by its larger spores and more narrow lamellae.

Fomes albogriseus

Pileus elongated ungulate, externally hard, lignose, concentrically sulcate, azonate, the younger parts of the crust isabelline or pale gray, suffused with a slightly detersible pruinosity, the older parts becoming uneven, rimose and blackish gray, inner substance somewhat soft, friable, whitish; pores minute, obscurely stratose, white within, their mouths pallid or isabelline.

Pileus 7–35 cm. long, 10–25 cm. broad, 5–15 cm. thick.

Trunks of tamarack and white pine. Kent county, Michigan. July. B. O. Longyear. In size and shape this fungus resembles elongated forms of *F. fomentarius*, and it does not differ greatly in color from faded specimens of that species. In the character of its annual increments it resembles *Polyporus juniperinus* Schrenk. Each new increment is a little smaller at its base than the adjacent part of the one preceding it. Consequently the mouths of the marginal pores of the older increments can be seen in the furrows that separate the increments. *Polyporus officinalis* is said to inhabit the larch, but its pileus is described as variegated with yellowish and fuscous zones and as having a farinaceous odor, a bitter taste and short pores, characters not shown by our fungus.

Hydnum conigenum

Pileus coriaceous, 1–2 cm. broad, obconic, nearly plane above, even, minutely downy, grayish orange or yellowish orange, some-

times split on the margin, substance fibrous, azonate, orange brown; spines short, decurrent, whitish becoming brown; stem slender, central or sometimes eccentric, colored like the pileus, thickened at the base by a dense spongy mass of orange-colored tomentum; spores globose, colored, 4–5 μ in diameter.

Fallen cones of bull pine, *Pinus ponderosa*. Base of Moscow Mountains, Idaho. Autumn. L. F. Henderson. Similar in color to *H. aurantiacum*, but differing in its small size, slender stem, even pileus, zoneless substance and peculiar habitat.

Hydnum cyaneotinctum

Pileus slightly tough but of a soft spongy texture, nearly plane above, minutely tomentose, whitish or buff, tinged with blue on the margin, flesh isabelline or pale buff above, sometimes tinged with blue below; spines short, pallid, becoming ferruginous brown; stem short, firm, covered nearly to the pileus with a dense spongy isabelline tomentum; spores globose, verrucose, colored, 4 μ in diameter.

Pileus 3–6 cm. broad; stem about 2.5 cm. long.

Orris Island, Maine. September. Miss H. C. Anderson. This species is related to *H. suaveolens*, from which it differs in the color of its flesh, in the absence of odor and in the dense tomentum of the stem.

Clavaria densissima

Tufts 7–10 cm. high, nearly as broad, very dense, closely and intricately branched from the base, the branches solid, white within, often compressed, very crowded, repeatedly and irregularly branching, sometimes anastomosing, pale ochraceous when dry, the ultimate branches more or less compressed and dilated, terminating in two or more blunt or pointed whitish tips; spores naviculoid, often uninucleate, 8–10 μ long, 4–5 μ broad; mycelium whitish.

Much-decayed vegetable matter in mixed woods. Greenville, Michigan. October. B. O. Longyear. Near *C. densa* and *C. condensata*, but from the latter it differs in color and from the former in its more compact mode of growth, compressed branches, more narrow spores, and in having the tips of the branches differing in color from the branches themselves. The branches appear glabrous to the naked eye, but under a lens they have a minutely velvety appearance. This indicates a relationship to the genus

Lachnocladium, but it is not clearly shown by the dried specimens that the texture is coriaceous.

Cytosporella macrospora

Perithecia prominent, at first covered by the epidermis, then erumpent, orbicular, sometimes oblong by confluence, blackish within, imperfectly plurilocular, 1–2 mm. broad; spores obovate or broadly elliptic, hyaline, 10–15 μ long, 7–8 μ broad, supported by slender sporophores which are longer than the spores.

Branches of cottonwood, *Populus deltoides*. Near Chicago, Illinois. May. H. Hasselbring. Remarkable for the large size of its spores. Its nearest ally seems to be *C. Populi* Oud., but the spores of the latter are described as almost perfectly globose and 7 μ in diameter.

Sepedonium macrosporum

Hyphae creeping or erect, hyaline, septate, branched, forming a white downy coat over the matrix, the ultimate branches ending in a long subulate point; spores large, globose, colorless, 30–40 μ in diameter, with a thick epispore and a large shining nucleus.

On some small *Clavaria*. New Jersey. E. B. Sterling. Easily distinguished by its peculiar habitat and its large even globose colorless spores.

Morchella punctipes

Ascomate conical, subacute, free to the middle, longitudinally ribbed, the costae sparingly branched toward the margin, connected by transverse veins, pallid with the edges blackish in the dried specimens; stem hollow, swollen toward the base, minutely squamulose or furfuraceous, whitish; asci cylindric, 8-spored; spores elliptic, even, 20–30 μ long, 14–18 μ broad.

Ascomate 1.5–2.5 cm. long; stem 7–10 cm. long, 1–2 cm. thick.

Agricultural College, Michigan. June, B. O. Longyear. This species is closely allied to *M. gigas*, *M. rimosipes* and *M. semilibera*. From the first two it may be separated by the pileus being free from the stem, at least to the middle, and from the last by its larger spores and squamulose stem. The adornment of the stem consists of small conical points which are sometimes darker colored than the stem and are then more conspicuous. In

larger specimens there are one to four perforations at the base, but no chinks as in *M. rimosipes*. The inner surface of the stem is glabrous.

Mitruliopsis gen. nov.

Ascomate fleshy, obovate or spathulate, stipitate; asci 8-spored, aparaphysate; spores filiform.

A genus related to *Mitrula* and *Spathularia*, but with filiform spores.

Mitruliopsis flavida

Ascomate fleshy, soft, tender, stipitate, very variable, obovate or subspathulate, terete or compressed, sometimes lobed at the base and decurrent on the stem, creamy yellow, flesh white; asci subfusiform, 120–160 μ long, 8-spored; spores filiform, hyaline, 60–80 μ long, 2 μ broad; stem equal or slightly tapering upward, pallid, hollow, 12–20 mm. long, 2–3 mm. thick.

Steep shaded banks. Near Moscow, Idaho. Autumn. L. F. Henderson. The hymenium is distinct from the stem and often lobed at the base. When the club is compressed the lobes are generally decurrent and then the fungus might easily be taken to be a species of *Spathularia*.

Helvella brevissima

Pileus irregular, convolute, with the deflexed margin free, blackish when dry, whitish or pallid beneath, 1–2 cm. broad; stem very short, even, solid, whitish or pallid, 1–1.5 cm. long, 3–4 mm. thick; asci cylindric; spores elliptic, commonly binucleate, 15–20 μ long, 10–12 μ broad; paraphyses filiform, thickened at the top and there brown.

Ground. California. W. R. Dudley.

Plectania rimosa

Cups 1.5–2.5 cm. broad, cupulate, the margin involute, externally minutely hairy, black, with a few simple or sparingly-branched costae extending upward from the base, hymenium black, rimose; stem short, irregular or compressed, often tapering downward; asci cylindric; spores unequally elliptic or oblong, two- to four-nucleate, uniseriate, 22–30 μ long, 12–14 μ broad, the brown paraphyses slightly thickened above.

California. W. R. Dudley.

Peziza convoluta

Cups sessile, irregular, externally glabrous, wrinkled or vaguely reticulated, yellowish brown or tawny brown, the margin widely spreading, variously curved, deflexed, wavy or contorted, the hymenium convolutely folded, tawny brown; asci cylindric; spores uniseriate, elliptic or oblong, 20–22 μ long, 12–15 μ broad.

Sandy soil, California. W. R. Dudley. The abundant white mycelium binds together a ball of sand which adheres to the base of the specimens. The remarkable feature of this species is the irregularity of its cup with the convolutions of the hymenium.

GEOLOGICAL HALL, Albany, N. Y.

A fossil Petal and a fossil Fruit from the Cretaceous (Dakota Group) of Kansas

By Arthur Hollick

Included in a collection of fossil plant remains from the Cretaceous (Dakota Group) of Kansas, recently obtained by the New York Botanical Garden from Mr. Charles H. Sternberg, of Lawrence, Kans., are two exceedingly interesting specimens — one representing a large petal, the other a fleshy fruit.

Petals, as fossils, are exceedingly rare, and I am not acquainted with any published figure of anything of the kind which can compare with ours, in regard to either size or satisfactory condition of preservation. Unfortunately, a portion of the upper part, including the apex, is gone, but it is sufficiently perfect to indicate what was its original shape, and the principal characters of the nervation are plainly discernible.

Careful examination and comparison has shown that, in all essentials, it agrees with the petals of some of our large-flowered magnolias, such as *M. foetida* Sarg. and *M. macrophylla* Michx., and as some ten species of *Magnolia*, founded upon more or less well-defined leaves, have been described from the Dakota group, I have decided to refer it to that genus.

The probabilities, of course, are that it belongs to a species to which one of the fossil leaves belongs, but as it is impossible definitely to connect the petal with any one of these a distinctive name is necessary, which should indicate that the fossil was a petal and not a leaf.

Magnolia palaeopetala sp. nov.

Petal apparently ovate-spatulate in outline, about 15 cm. long by 10 cm. broad, convex, laterally constricted and incurved at the base; margin entire, wavy or flexuous; nervation flabellate, dictyodrome, simple and well defined below, forking and thinner above, anastomosing, the areolae and reticulations becoming successively smaller and the nervilles finer, towards the margin. (*Fig. A.*)

Locality: Ellsworth Co., Kans.

It is apparent that this petal must have possessed a texture more or less coriaceous, as otherwise its preservation in such a relatively coarse medium as the Dakota sandstone would have been impossible, and this supposition is supported by the fact that the convexity of the surface, the incurving of the base and margin and the constriction of the former, all appear to have been characters of the living flower and not to be due to subsequent distortion by fossilization.

FIG. A. *Magnolia palaeopetala* Hollick.

The fruit is plainly that of a fig, and although some twenty-three species of *Ficus* have been described from the Dakota group they were based upon leaf-impressions alone. Only two specimens of fruit were known and these were too ill-defined to admit of specific description. ("Fruits of *Ficus*," Lesq. Fl. Dak. Group, 85. *pl. 10. f. 7, 8.* See our Fig. B, 2, 3.) They are incidentally mentioned however as being associated with leaves of *Ficus inaequalis* Lesq.

Specimens considerably more satisfactory were described and figured by Heer in 1874, from the lower Atane beds of Greenland — representing a geological horizon which is practically the equivalent of the Dakota group — under the name *Ficus protogaea* Heer * (Fl. Foss. Arct. 3^2: 108. *pl. 30. f. 5–7.* See our Fig. B, 4, 5, 6.)

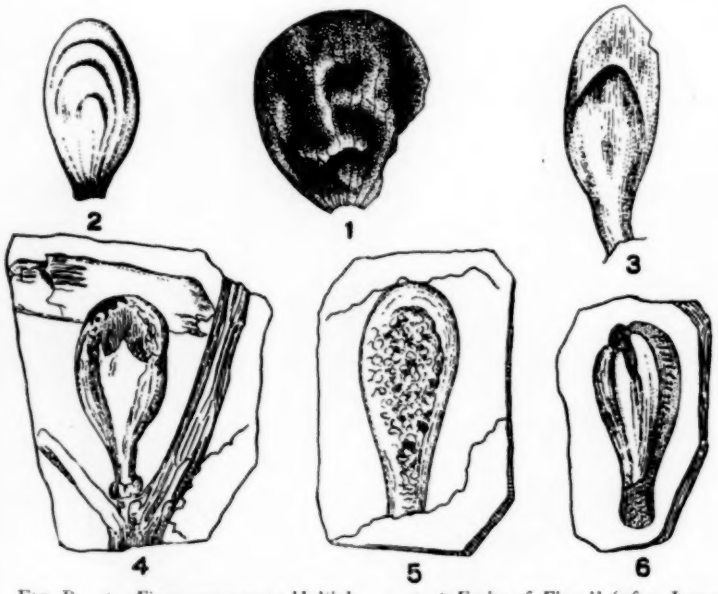


FIG. B. 1. *Ficus neurocarpa* Hollick. 2, 3. "Fruits of *Ficus*" (after Lesquereux). 4–6. *Ficus protogaea* Heer (after Heer).

* The name *Ficus protogaea* was previously used by Ettingshausen, in 1867, in describing a fragmentary fossil leaf from the Cretaceous of Niederschoena in Saxony (Sitzb. Akad. Wiss. Wien, Math.-Nat. Cl. 55: 249. *pl. 2. f. 5.*) In any revision of the genus it would therefore be necessary to rename these fruits. In this paper however it is not thought necessary to do anything more than to call attention to the fact.

These five specimens are the only ones which I have found recorded as occurring in the same geological horizon as that to which our specimen belongs, or in any strata which may be regarded as its equivalent, and none of them is equal to ours as a specimen, so far as may be judged from the figures.

Ficus neurocarpa sp. nov.

Fruit broadly obovate-spatulate in outline, 2.8 cm. long by 2.4 cm. maximum width, thick and wrinkled towards the middle, flattened more or less at or near the margin, minutely punctate and delicately nerved; primary nerves convergent but distinct and separated from each other at the base, divergent and becoming thinner and indistinct above, where they anastomose; secondary nerves very fine and apparently irregularly disposed. (*Fig. B, 1.*)

Locality: Ellsworth Co., Kans.

This fossil has very much the appearance of many dried herbarium specimens and it is evident that it must have possessed considerable consistency in order to retain its original shape, as it has done to a certain extent, under the pressure to which it must have been subjected.

Notes on Antillean Pines with Description of a new Species from the Isle of Pines

By W. W. Rowlee

During a trip to southern Florida, Cuba and the Isle of Pines last year, I made a special effort to compare the pines of these three regions, with the result that I am convinced that the pine of southern Florida, *P. heterophylla* of recent authors, is not identical with Grisebach's *P. Cubensis*. The cones of the Florida species are very different from those of the Cuban pine. *Pinus Cubensis* is apparently much closer in affinity to the Loblolly pine (*P. Taeda*) than to *P. heterophylla* and it is possible, though rather improbable, that the Loblolly and the Cuban pine are not specifically distinct.

The pines of the West Indies and the coast region of the southeastern United States grow under conditions of climate and soil very different from the species of the northern and western states. The vegetation associated with them records this, as it is decidedly xerophytic in tendency.

Fortunately the West Indian pines have not been encumbered with the synonymy that attaches to the Mexican species. Indeed it would seem that the recognized botanical species are fewer than the forms that are popularly recognized. We were told on the Isle of Pines that the natives distinguish five kinds of pines when cutting timber. We found sufficient warrant for two, but concluded that the other differences depended upon age and other individual rather than specific traits. One thing was very noticeable, namely, the great uniformity of the pine growths of the whole Antillean region. This was manifest not only among the pines themselves but also in the character of the accompanying plants. The shores washed by the Gulf Stream from its entry into the Caribbean Sea until it passes north of the frost line, whether island or continental, have a strikingly uniform flora. One of the effects apparently upon the pine is to increase the density

and relative amount of the summer wood in the annual ring, thereby increasing the weight per cubic foot and also the hardness of the wood, hence the name hard pine. They are the heaviest pine woods known, indeed there are, so far as the writer is aware, no other coniferous woods whose weight equals them. Their wood is as heavy as that of white oak.

The ecological significance of the dense summer wood is, it seems to me, to be found in the necessity of these plants to adapt themselves to a very dry season. By its development the trunk of the tree is encased in dense layers of wood and the escape of water is thereby largely prevented. The dry winds and continuous heat of the region where the hard pines occur suggest that a response on the part of the plant might be expected. No soft pines grow under these conditions and other coniferous woods are scarce while the hard pines often form nearly pure forests.

Another result of my observation was the discovery of an apparently undescribed species on the Isle of Pines and from the position of the scales when the cone opens I propose for it the following name:

Pinus recurvata sp. nov.

Trees of medium to large size with wide-spreading and rounded top; bark of trunk vertically and horizontally fissured but not flaking off; wood very heavy (52 lbs. to cu. ft. when seasoned): branches roughened by scars of bracts and needle-clusters; bracts decurrent on the branch, brown with hyaline margins, recurved, deciduous above the prominent base, after the needles develop: sheath smooth, its scales ciliate on the margins, 0.5 cm. long; needles gray, 3 in a fascicle, 20 cm. long, 2 mm. wide, rounded and 12-striate on the outer, plane with prominent sharply angled midrib on the inner side, 6-striate each side of the midrib, finely and sharply serrate: cone when closed cylindrical, when open ovate, 10 cm. long, 5 cm. thick at the base; scales recurved, remaining compact at the base, 1 cm. wide, dark brown, apophysis inequilateral, slightly rounded and depressed, horizontal carina distinctly evident, umbo diamond-shaped, with a short straight prickle.

In general appearance, and in leaves and vesture of the branches, this species agrees closely with *P. palustris*. The cone is, however, only one half as large, and the depressed umbo and straight prickle are not like that species. Its cone is even more unlike that of *P. heterophylla* and *P. Cubensis*. The Mexican pine,

Pinus Montezumae, has a cone more like this species than any other I have seen, but this is a five-needled pine. Specimens were collected at Santa Rosalie, Isle of Pines. The tree also occurs commonly over the island.

Of the several kinds of pine distinguished on the island by the natives, the wood of this species is preferred over all others for construction. It has been extensively exported to Cuba, and although the forests are showing considerable ability to regenerate and perpetuate themselves in spite of frequent burning, there is but a remnant left of what must have been originally a magnificent pine forest. The island is certainly well named. Several tracts have been boxed for turpentine but have not been utilized in recent years. It was said that the boxing was mainly done during our Civil War.

It grows commingled with what we considered *Pinus Cubensis* Grisebach, and was confined to the higher parts of the island but did not occur on the mountains.

Pinus Cubensis grows well down toward the shores of the island and in these situations we collected specimens which may be designated:

P. Cubensis anomala var. nov.

Tree 6–9 m. high: needles slender, 3 in a fascicle, bracts 6–8 mm. long, green on the young shoots and resembling the leaves of a spruce, and persistent during the first season.

Dr. Engelmann notes the same tendency in *Pinus serotina* where trees had been felled and new shoots subsequently developed, or posts from freshly cut trees set in the ground. (Trans. Acad. Sci. St. Louis, **4**: 183. 1880.)

The cones and needles of these trees did not present any departure from *P. Cubensis* and we concluded that the smaller size of the trees and the peculiar development of the bracts was due to the proximity of the sea or some other environmental cause. There were several trees near Jucaro Landing on the eastern side of the island. The reversion of the scales to what is generally considered the primitive form of the primary leaf of the pine is an exceedingly interesting phenomenon.

CORNELL UNIVERSITY.

The Polyporaceae of North America. II. The Genus Pyropolyporus *

By William Alphonso Murrill

The European species of this genus were first separated into a distinct generic group by Quélet in his "Enchiridion Fungorum" published in 1886. His genus *Phellinus* established at that time contained four species, *P. igniarius* (L.), *P. fulvus* (Scop.), *P. conchatus* (Pers.) and *P. salicinus* (Pers.), and was characterized as follows: "Pileus velvety, persisting; context corky; pores small, fulvous brown; spores ovoid, fulvous. Plants lignatile." The name *Phellinus*, however, is preoccupied by *Phelline* assigned in 1826 to a genus of the Ebenaceae. The new name *Pyropolyporus* here proposed refers to the use of some species of this group in ancient times for the purpose of keeping fire.

Synopsis of the North American Species

1. Pileus thick, ungulate, woody, margin obtuse, tubes several times stratified, the upper layers not dying before the lower. 2.
   Not as above. 11.

2. Context yellowish brown. 3.
   Context reddish orange; plants growing on trunks of *Juniperus*. 10.

3. Spores hyaline. 4.
   Spores yellowish brown. 7.

4. Pileus becoming more or less rimose with age. 5.
   Pileus covered even in age with a smooth horny crust. 6.

5. Pileus simple, sulcate, sometimes polished, margin usually narrow and rounded; not found on species of *Prunus*. 1. *P. igniarius.*
   Pileus terraced, imbricate or semiresupinate, rarely sulcate, never polished, margin broad, making an obtuse angle; found on species of *Prunus*. 2. *P. fulvus.*

6. Context ferruginous, surface dark brown marked with narrow black concentric lines, tubes thin-walled, 5 to a mm. 3. *P. crustosus.*
   Context tawny, surface black without lines and more sulcate, tubes smaller, thick-walled, 7 to a mm. 4. *P. Calkinsii.*

7. Pileus soon becoming rimose. 8.
   Pileus not rimose, broadly sulcate, zonate, tubes thin-walled, spores 3 μ in diameter, spines large and abundant; growing on *Quercus*. 5. *P. Everhartii.*

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* Read by invitation before the Botanical Society of America at Washington, January 1, 1903.

8. Tubes long, over 0.5 cm. each season, walls thin, pores large, 3 to a mm. 9.
Tubes very short, 0.1–0.5 cm. long each season, walls equalling tubes in thickness, pores small, 5 to a mm., spores globose, 4–5 μ, cystidia none; growing abundantly on *Robinia*. 6. *P. Robiniae.*

9. Spores globose, 3–4 μ in diameter, cystidia present; pileus blackish, very rimose, hymenium convex, margin truncate, at length hoary. 7. *P. praerimosus.*
Spores ellipsoidal, 7 × 9 μ, cystidia none; pileus dark brown, hymenium concave, margin not hoary. 8. *P. Underwoodii.*

10. Older pores visible in projecting annual layers, tubes 3–4 to a mm., thin-walled; pileus deeply furrowed, not rimose. 9. *P. juniperinus.*
Older pores not externally visible, tubes 1–2 to a mm., thicker walled; surface very rimose. 10. *P. Earlei.*

11. Spores hyaline. 12.
Spores yellowish brown. 15.

12. Cystidia abundant, pointed, dark brown; pileus thin, woody, rigid, tubes short, 5 to a mm. 11. *P. conchatus.*
Cystidia none. 13.

13. Context thick, woody, honey-yellow, surface encrusted, margin blunt. 12. *P. Haematoxyli.*
Context thin, punky, darker brown, surface without a crust, margin sharp. 14.

14. Pileus 10–25 cm. broad, covered with narrow shallow furrows, margin undulate or lobed, pores minute, 8–9 to a mm. 13. *P. Langloisii.*
Pileus smaller, deeply sulcate, pores larger, 6 to a mm.; growing on species of *Ribes*, very rarely on other shrubs. 14. *P. Ribis.*

15. Dissepiments thick, hymenium concolorous with context. 16.
Dissepiments thin, hymenium darker than context. 17.

16. Pileus very rimose, cystidia present; tubes fulvous, 7 to a mm., spores globose, 3.5–5 μ, cystidia 17–35 μ. 15. *P. Yucatanensis.*
Pileus scarcely rimose, encrusted, becoming smooth, cystidia absent; margin undulate, tubes 8 to a mm., spores globose. 16. *P. senex.*

17. Pileus hard and heavy, surface sulcate, brown, clothed with lime-white hair, spores 3.5 μ, spines 40–60 μ. 17. *P. linteus.*
Upper layers of pileus dead, projecting 1–2 cm. beyond the lower, tube strata separated by thin layers of context, tubes 7 to a mm., spores 5–7 μ, cystidia absent. 18. *P. Jamaicensis.*

1. **Pyropolyporus igniarius** (L.)

Boletus igniarius L. Sp. Pl. 1176. 1753; Tourn. Inst. 1: 562. *pl. 330. f. A.* 1719.

Polyporus igniarius Fries, Syst. 1: 375. 1821.

Fomes igniarius Gill. Champ. Fr. 1: 687. 1878; *pl. 156.*

Phellinus igniarius Quél. Ench. 172. 1886.

This plant is one of the oldest fungi known, having been used from very early times for keeping fire, whence the name. It is also abundant and widely distributed, occurring on birch, willow, beech, maple, oak, poplar, apple and many other deciduous trees in various parts of the world. Fruit-bodies observed on apple, willow, aspen, birch, etc., in Sweden, agree perfectly with those growing in the New York forests; while the variations found in Europe are duplicated here, even to the abundance or scarcity of spines in the hymenium.

Specimens are to be found in all published exsiccati bearing upon this group. Among the large number of collections examined, the following may be mentioned: New York (Underwood), New Hampshire (Miss Minns), Ottawa, Canada (Macoun), New Jersey (Ellis), Virginia (Murrill), Kansas (Bartholomew), Indiana (Underwood), Colorado (Earle), Labrador (Waghorne), Maine (Ricker), New Mexico (Earle), Finland (Karsten), Sweden (Murrill), Thüringen (Underwood).

Two forms of *P. igniarius* are listed as distinct species in Saccardo's Sylloge, *i. e.*, *Fomes badius* Berk. and *Fomes nigricans* Fries. The former was collected in Arctic North America by Dr. Richardson and the type is at Kew. The specimen is $5 \times 6 \times 2.5$ cm. and has three layers of tubes which, in the brief northern season, were forced to develop quickly and are therefore thinner-walled than in our forms. Berkeley himself doubted if the plants were sufficiently distinct from *P. igniarius*.

Fomes nigricans Fries, on the other hand, is decidedly different from typical *P. igniarius*, being neat and smooth and shining black, and rimose in two directions when old. Fries observed it on birch only. Persoon noticed it also frequently on old willows, and Underwood has collected fine specimens of the same form on beech in the New York mountains. While studying living plants on willow trees in Sweden, I found stages on the same tree connecting this variety with the typical form and am convinced that we are not here dealing with two distinct plants but with variations due to season, food supply, rapidity of growth, or some other physiological cause yet to be determined. Specimens have been examined from Finland (Karsten, Starbäck), Sweden (Romell, Murrill), Newfoundland (Waghorne), Greenland (Rostrup), New

Hampshire (Miss Minns) and New York (Underwood). Klotsch's collections from Scotland are *Polyporus fomentarius* L. of advanced age and indurated. This is the conception of *F. nigricans* at Berlin (see Sydow, Myc. Mar. No. 2604). At Kew, *F. nigricans* has been considered "rare the world over." A tiny specimen 2 × 3 × 2 cm. in the herbarium of Berkeley sent from Upsala presumably by Fries himself has the external appearance of *F. nigricans* (see Fries, Icon. *pl. 184*), but its size would indicate that it is *Poria levigata* Fries, in its pileate form, a state of this fungus not known to Fries and easily confused with depauperate forms of *F. nigricans*. The other specimens at Kew are all old hardened forms of *P. fomentarius* L.

2. **Pyropolyporus fulvus** (Scop.)

Boletus fulvus Scop. Fl. Carn. Ed. 2. **2**: 469. 1772.

Polyporus igniarius b. minor, subperpendicularis Fries, Syst. **1**: 375. 1821.

Polyporus fulvus Fries, Hym. Eur. 559; Icon. *pl. 184, f. 3*.

Fomes fulvus Gill. Champ. Fr. **1**: 687. 1878.

Phellinus fulvus Quél. Ench. Fung. 172. 1886.

Fries at first considered *Boletus pomaceus* Pers. synonymous with *B. fulvus* Scop., but later decided, and correctly so, that it is only a form of *P. igniarius* L. In Micheli's no. 9, p. 119, of his genus *Agaricum*, the two forms are confused, though his figure, *pl. 61*, ordo II, doubtless represents *P. fulvus* growing on *Prunus* and not *P. igniarius* growing on *Malus*. This confusion still exists in European herbaria and it is impossible to determine in them what is meant by *Polyporus fulvus* Fries. In the following description Scopoli very plainly characterizes the plant under discussion: "Totus fulvus; poris difformibus, non adeo profundis. Habitat in cerasis recens detruncatis. Junior integerrimus, adultus vero margine sinuatus. Fulvus color in margine et subtus evidentior. Poruli obsoleti, totum fungum subtus non semper occupant."

Pl. Crypt. France par Desmazières no. 5157. "Sur les pruniers et les cerisiers." Fung. Selec. Exsic. par Roumeguère No. 6963. "Forma *Cerasi*, sur un vieux cerisier." Trienti (Bresadola) on *Persica*, Eisenach and Thuringen (Underwood) on *Prunus*, Sweden (Murrill) on *Prunus*, and on *Prunus* both wild and

cultivated, in America in Alabama (Underwood), Colorado (Bethel, Cameron, Crandall), Kansas (Bartholomew, Cragin), Missouri (?), Nebraska (Webber), Ohio (Lloyd), Tennessee (Schrenk).

This fungus is very uniform in habit and appearance both in Europe and America, where it occurs on various species of *Prunus* and its near allies. Although confused in literature with *Polyporus igniarius* L., it is very distinct and always easily recognized. In an orchard near Mauritzberg, Sweden, where *P. igniarius* was abundant on apple trees, *P. fulvus* was confined to the stumps and dead or dying trunks and branches of plum trees.

3. **Pyropolyporus crustosus** sp. nov.

An ungulate plant of medium size with brown tubes, ferruginous substance and smooth encrusted dark brown surface. Pileus woody, convex above, plane below, somewhat compressed ungulate, 7×12×5 cm.; surface glabrous, horny encrusted, dark brown, concentrically sulcate, marked with narrow black concentric lines; margin rounded, yellowish brown, sterile: context hard, concentrically banded, ferruginous, 2 cm. thick behind; tubes indistinctly stratified, 0.5–1 cm. long each season, 5–6 to a mm., drab-colored within, mouths polygonal, concolorous, edges thin, acute, entire: spores globose to ovoid, smooth, thin-walled, hyaline, 3.5–4×4 μ, hyphae darker, cystidia none.

Collected by Earle on a standing tree trunk at an altitude of 4,000 feet on Rose Hill, Jamaica, October, 1902.

4. **Pyropolyporus Calkinsii** sp. nov.

A large ungulate fungus glabrous and furrowed above and uniformly hard and fulvous within. Pileus very hard woody throughout, ungulate, 10 × 10 × 10 cm.; surface glabrous, dark brown to black, marked with rather shallow concentric furrows, crust thin, horny, never rimose; margin rounded, concolorous with the hymenium: context very hard woody, fulvous, 1 cm. thick; tubes in many indistinct layers, slender, minute, 7 to a mm., fulvous, mouths nearly circular, obtuse, entire: spores ovoid, hyaline, with thick, smooth, pale ferruginous wall, 3–5 × 5–7 μ, hyphae ferruginous, cystidia none.

This species occurs on living trees of live-oak in Florida, where it was collected in considerable quantity by Major W. W. Calkins during the winters of 1886 and 1887. Several specimens are in the herbarium of the New York Botanical Garden and a single

specimen in the herbarium of the Division of Vegetable Pathology and Physiology of the U. S. Department of Agriculture.

5. **Pyropolyporus Everhartii** (Ell. & Gall.)

Mucronoporus Everhartii Ell. & Gall. Journ. Myc. **5**: 141–142. *pl. 12.* 1889.

Xanthochrous Everhartii Pat. Cat. Tun. 51. 1897.

The type of this fungus is in the herbarium of the New York Botanical Garden. Since its discovery on the living trunk of a scarlet oak in New Jersey, it has been collected in several localities on various species of oak and occasionally on beech. Before its separation as a distinct species it had been confused with *P. igniarius*, which it outwardly resembles in some particulars.

Collections: New York (Ellis, Mrs. Ellis, Murrill), New Jersey (Ellis, Ely), Canada (Dearness), Indiana (Gentry), Pennsylvania (Herbst) and Delaware (Commons, Ellis N. A. Fungi no. 3303).

6. **Pyropolyporus Robiniae** sp. nov.

A large fungus with dark rimose surface and tawny hymenium very common on *Robinia pseudacacia*. Pileus hard woody, dimidiate, ungulate to applanate, 5–25 × 5–50 × 2–12 cm.; surface velvety, smooth, soon becoming very rimose and roughened, fulvous to purplish-black, at length dull black, deeply and broadly concentrically sulcate; margin rounded, velvety, fulvous: context hard woody, concentrically banded, 1–3 cm. thick, fulvous; tubes stratose, 0.15–0.5 cm. long, 5 to a mm., fulvous, mouths subcircular, dissepiments entire, equalling tubes in thickness: spores subglobose, smooth, thin-walled, ferruginous, copious, 4–5 μ, cystidia none.

This fungus was one of the first to be noticed by collectors in this country, but has been unnamed until the present time. Schweinitz called it *Polyporus igniarius* and remarked that it was "frequent especially on *Robinia*"; Berkeley confused it with his *P. rimosus* described from Demerara and the Cape of Good Hope, and Cooke allayed Morgan's anxiety by assigning it most positively to the same category. To be sure, it resembles *P. rimosus* Berk. from Demerara, but the two plants are entirely distinct in appearance and shape and *P. rimosus* lacks the decided imbricated-rimose effect so characteristic of our plant. It was from the African plant, a different thing from *P. rimosus*, that the name *rimosus* must

have been obtained. It is truly rimose like *R. Robiniae*, but differs decidedly from the latter in pore-structure and context, while the spores are larger and less globose. It would be quite remarkable if a group of plants from such widely separated localities did not show specific differences.

P. Robiniae is abundant in the southern United States on *Robinia* and extends with it as far north as Connecticut and west to Missouri and Texas. I have not as yet seen it upon any other host, but a plant recently collected by Earle in Jamaica on *Acacia emarginata*, nearly related to *Robinia*, seems not specifically distinct from it. When *Robinia* was introduced into France several centuries ago from Virginia this fungus must have been introduced with it, since it was collected there by F. Fautrey in November, 1891, growing on *Robinia*. The specimen is at Upsala and is labelled *P. igniarius*. Among the many collections examined from America, the following may be mentioned: Massachusetts (Underwood); New York (Underwood, Earle, Murrill); New Jersey (Ellis); Ohio (James, Morgan, Lloyd); West Virginia (Nuttall); Virginia (Miss V. W. Murrill); Alabama (Underwood, Atkinson, Earle).

A good account of the destructive effects of this plant is given by H. von Schrenk in Ann. Rep. Mo. Bot. Gard. **12**: 21–31. *pl. 1–3*. 1901.

7. **Pyropolyporus praerimosus** sp. nov.

A large ungulate plant with plane brown hymenium and a very rimose blackish surface. Pileus woody, rounded ungulate, 8–12 × 7–10 × 8–11 cm.; surface exceedingly rimose after the first year, broadly furrowed, the projecting ridges splitting away in age, very dark brown to black; margin obtuse, velvety, rusty to hoary: context corky to woody, concentrically banded, fulvous, 0.5 cm. or less thick; tubes indistinctly stratified, 1–2 cm. long each season, 3 to a mm., concolorous within and without with the context, mouths rounded to polygonal, ochraceous at first, edges rather thick, obtuse, becoming thin and often splitting in age: spores globose, smooth, deep ferruginous, 3–4 μ; spines ferruginous, 10–17 × 5–10 μ, largest at the base.

Collected by Earle, July, 1900, on *Quercus undulata* in the El Capitan Mountains, New Mexico, at an altitude of 7,000 feet. Related to *P. Everhartii* (Ell. & Gall.).

8. **Pyropolyporus Underwoodii** sp. nov.

A blackish ungulate plant of large size with furrowed rimose surface and long brown tubes. Pileus woody, broadly ungulate, attached by a narrow base, concave below, $7 \times 14 \times 11$ cm.; surface many times concentrically furrowed, rimose, uniformly dark-brown to black; margin fulvous, acute or somewhat obtuse, velvety, undulate, marked with narrow zones: context hard, fulvous to dark brown, very thin, less than 0.5 cm.; tubes distinctly stratified, 0.5–1.5 cm. long each season, 3 to a mm., brown within, mouths darker, circular or polygonal, edges acute, entire: spores ellipsoidal, smooth, thin-walled, light yellowish-brown, $7 \times 9\,\mu$, cystidia none.

Collected by Underwood and Griggs during the summer of 1901 near Coamo Springs, Porto Rico. The plant reminds one of *P. Robiniae*, but differs very widely in tube-structure, as well as in color, density and spore characters.

9. **Pyropolyporus juniperinus** (Schrenk)

Polyporus juniperinus Schrenk, U. S. Dept. Agr. Veg. Physiol. Bull. **21**: 9–16. *pl. 1–4.* 1900.

So far as I know, there are only two specimens of the fruiting stage of this plant in existence, one collected by Schrenk in Tennessee and the other by Miss Sadie F. Price in Kentucky. The latter specimen, the better developed of the two, was sent to the Underwood herbarium in 1895.

Both specimens were found upon *Juniperus Virginiana*, the wood of which is badly affected by its mycelium. The statement made by the author that the discovery of other specimens might prove this species to be only a form of *P. fomentarius* is entirely unnecessary, since such connection between two plants so distinct is beyond the range of possibility.

10. **Pyropolyporus Earlei** sp. nov.

A broadly ungulate plant with yellow pores, red context and a dark very rimose surface. Pileus woody, attached by a broad base, plane below, $6 \times 13 \times 17$ cm.; surface concentrically sulcate, very rimose in older parts, fulvous to brownish-black, at length grayish-black from weathering; margin broad, obtuse, dark yellowish-orange, clothed with short dense tomentum of the same color: context woody, dark reddish-orange, concentrically banded with darker lines, very thin, 0.5 cm., rimose down to the

tubes; tubes unevenly stratified, 0.5–0.75 cm. long each season, 1–2 to a mm., ochraceous within during the first season, afterwards latericeous, mouths circular, ochraceous, edges obtuse, rather thin: spores ellipsoidal, smooth, thick-walled, ferruginous, 7–8 × 9 μ.

Collected by Earle in August, 1900, on a standing trunk of *Juniperus* in the El Capitan Mountains, New Mexico, at an attitude of 7,000 ft. It is closely related to *P. juniperinus* (Schrenk), but it is much more rimose, has larger pores and lacks the annual projecting margins of the older tube-layers so characteristic of that species.

11. **Pyropolyporus conchatus** (Pers.)

Boletus salicinus Pers.; Gmel. Syst. **2**: 1437. 1791; Syn. 543. 1801. Not *B. salicinus* Bull. Herb. Fr. *pl. 433. f. 1.* 1789.

Boletus conchatus Pers. Obs. **1**: 24. 1796; Syn. 538. 1801.

Polyporus salicinus Fries, Syst. Myc. **1**: 376. 1821; Icon. *pl. 185. f. 2.*

Polyporus conchatus Fries, Syst. Myc. **1**: 376. 1821.

Fomes salicinus Gill. Champ. Fr. **1**: 684. 1878; Karst. Icon. 4, *f. 5.* 1883.

Phellinus salicinus Quél. Ench. 172. 1886.

Boletus salicinus Pers. and *Boletus conchatus* Pers. were different forms of the same plant. Most of the old willow stumps in Sweden are covered with it. On the sides of the stumps it is *B. salicinus* and farther up, where the pileus is reflexed, it is *B. conchatus.* This fungus is quite common in Europe and America on a variety of hosts. The following list includes only a few of the collections examined: Sydow, Myc. Mar. no. 3423; Ellis, N. A. Fungi no. 918; Romell, Fungi Suecici no. 12; England (Plowright), Sweden (Murrill), New York (Underwood, Ellis, Shear), Indiana (Underwood), Canada (Macoun), Ohio (Lloyd, Morgan), Pennsylvania (Rau).

12. **Pyropolyporus Haematoxyli** sp. nov.

A smooth applanate plant of considerable size with brownish tubes and honey-yellow context. Pileus woody, dimidiate, sessile, thickest behind, 12 × 14 × 4 cm.; surface glabrous, dark brown, shallowly concentrically sulcate, marked with numerous darker concentric lines; margin fulvous, thin, rounded, slightly undulate: context corky to woody, indistinctly concentrically banded,

honey-yellow, 1 cm. thick; tubes distinctly stratified, longer behind, 0.5–1 cm. long each season, 6 to a mm., dull brown, mouths polygonal, concolorous, edges obtuse, becoming thin; spores globose, rarely ovoid, thin-walled, smooth, hyaline, 3.5–5 μ, hyphae ferruginous, cystidia none.

Collected by Earle at the base of a living logwood tree in Paradise, Jamaica, November, 1902.

13. **Pyropolyporus Langloisii** sp. nov.

A large thin expanded fungus with brown hymenium and a brown or blackish surface. Pileus corky, fan-shaped, attached by a narrow base, often depressed behind, 8–13 × 10–25 × 0.3–1.5 cm.; surface at first anoderm, soft, clothed with brown tomentum, many times concentrically sulcate, at length glabrous, rough, indurate, black, marked with numerous shallow furrows; margin velvety, brown, thin, acute, undulate or slightly lobed: context soft to corky, indurate in age, deep brown, 0.2–0.5 cm. thick; tubes reviving, distinctly stratified, 0.2–0.5 cm. long each season, 9–8 to a mm., brown, mouths polygonal, concolorous, edges thin at maturity: spores globose, smooth, hyaline, 3 μ, cystidia none.

Collected in quantity several seasons in Louisiana by Langlois, exclusively on dead or dying hawthorn trees near the base of the trunk. Referred to *P. pectinatus* Kl., *P. senex* N. & M., *P. conchatus* Pers., and *P. Ribis* (Schum.) Fries by European mycologists, from all of which it is quite distinct, probably approaching nearest to the last. Several specimens from the various collections made by Langlois are in the Underwood herbarium and the herbarium of the New York Botanical Garden.

14. **Pyropolyporus Ribis** (Schum.)

Boletus Ribis Schum. Enum. Pl. Saell. **2**: 336. 1803.
Polyporus Ribis Fries, Syst. **1**: 375. 1821.
Polyporus ribesius Pers. Myc. Eur. **2**: 80. 1825.
Polyporus Ribis Fries; Sturm, Deuts. Fl. **3**: 137. *pl. 62.* 1837.
Fomes Ribis Gill. Champ. Fr. **1**: 685. 1878.

According to some authorities *P. Lonicerae* Weinm. and *P. Euonymi* Kalchb. are only forms of the above. Rabenhorst-Winter, Fungi Europaei, no. 2937; Roumeguère, Fungi Gallici, no. 3304; De Thümen, Myc. Univ., no. 509; Linhart, Fungi

Hung., no. 349; Krieger, Fungi Sax., no. 423; New York (Ellis); New Jersey (Geissman, Ell. &. Ev. N. A. Fungi no. 1693); Kansas (Bartholomew).

The usual host of this fungus is the red currant, but it is also found on other species of *Ribes* and occasionally upon other shrubs growing near by. Specimens from Bartholomew were collected on living stems of *Symphoricarpos occidentalis*, July 24, 1895; and it has also been reported as attacking rose-bushes.

15. **Pyropolyporus Yucatanensis** sp. nov.

A large blackish brown very rimose fungus with tawny tubes and substance. Pileus woody, dimidiate, applanate, thickest behind, 7–9 × 9–12 × 2–3 cm.; surface clothed at first with tawny tomentum, becoming very dark brown or black and uniformly tubercular and broken into small areas by numerous shallow concentric furrows and radial cracks; margin narrow, acute, velvety, fulvous: context hard, fulvous, 0.5 cm. thick; tubes rather indistinctly stratified, 0.25 cm. long each season, 7 to a mm., fulvous; mouths circular, punctate, edges thick, obtuse: spores globose or subglobose, smooth, pale yellowish brown, 3.5–5 μ, hyphae ferruginous, cystidia thick at the base, pointed, 17–35 μ.

Collected in Yucatan by Millspaugh and in Nicaragua by C. L. Smith.

16. **Pyropolyporus senex** (Nees & Mont.)

Polyporus senex Nees & Mont. Ann. Sci. Nat. II. **5**: 70–71. 1836.

Fomes senex Cooke, Grevillea, **13**: 118. 1885.

A number of specimens collected by C. L. Smith in Mexico and Nicaragua are in the New York Botanical Garden herbarium. Dr. Patouillard says they are typical *P. senex*. They are larger, thicker and more woody than plants from Florida and Louisiana that have been called *P. senex*.

17. **Pyropolyporus linteus** (B. & C.)

Polyporus linteus B. &. C. Proc. Am. Acad. Arts & Sci. **4**: 122. 1860.

Fomes linteus Cooke, Grevillea, **14**: 20. 1885.

The type specimens were collected on dead bark in Nicaragua. Plants collected in Nicaragua by C. L. Smith agree with the

types in all important particulars. The same species from Cuba is labelled *P. pectinatus* Kl. at Kew, though the latter plant does not, to my knowledge, occur in North America.

18. **Pyropolyporus Jamaicensis** sp. nov.

A rather small fan-shaped plant, the upper layers of which are dead and much cracked and roughened while the layers added below are smaller each succeeding year. Pileus woody, applanate, much thicker behind, 8 × 13 × 0.5–5 cm.; surface uneven, radiately rimose, dark brown to black; margin ferruginous, velvety, acute, becoming black, spreading and lobed, projecting 1–2 cm. beyond the new layers: context woody, fulvous, 0.5–1 cm. thick; tubes stratified, separated by thin annual layers of context, 0.2–0.7 cm. long each season, 7 to a mm., fulvous within, mouths rounded or polygonal, hoary when young, edges thin, acute, entire: spores globose or subglobose, thin-walled, smooth, pale golden-yellow (probably darker in age), 5–7 μ.

Collected by Earle, at Port Antonio, Jamaica, November, 1902, on an old stump of *Psidium*. The spores of the present season appear immature.

SPECIES INQUIRENDAE

In this list is included not only species at present unknown, but also plants described by foreign authors which have not been seen or have been as yet only slightly studied by the writer. *Polyporus extensus* Lév., *P. elatus* Lév., *P. Nicaraguensis* B. & C., *P. sarcitus* Fries, *P. sclerodes* Berk., *P. scleromyces* B. & C., *P. sordidus* Lév., *P. subflexibilis* B. & C., *P. Baccharidis* Pat., *Ganoderma Mexicanum* Pat., *Xanthochrous igniarioides* Pat.

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